



Colorado Department  
of Public Health  
and Environment



*Grand Junction, January 2013*



# Residential Wood Smoke Emissions

Western Colorado Regional Air Quality Collaboration Call #10

October 30, 2013

[www.colorado.gov/cdphe/residentialburning](http://www.colorado.gov/cdphe/residentialburning)

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Community Outreach Planner



# Agenda

- Smoke
  - Composition
  - Health Effects
  - Regional Data
- Residential Wood Smoke Emissions
  - Public Education
  - CDPHE Messaging
  - Regulations
  - Woodstove Changeout Campaign
  - Adopting/Revising local residential wood smoke ordinances



# SMOKE



# Woodburning Emissions

- The major emissions from woodburning are carbon monoxide, organic gases, particulate matter, formaldehyde, and nitrogen oxides.
- Wood smoke contains many compounds known to cause cancer





# PM<sub>2.5</sub> is particulate matter that is 2.5 micrometers in diameter and smaller

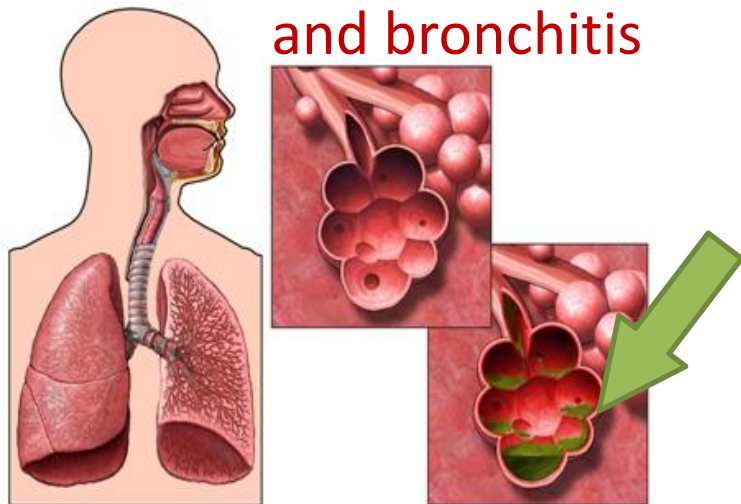
- Caused by combustion activities
- Found in woodburning smoke

For perspective,  
these particles are  
about 1/30<sup>th</sup> the  
diameter of a human  
hair



# What are the health effects of wood smoke?

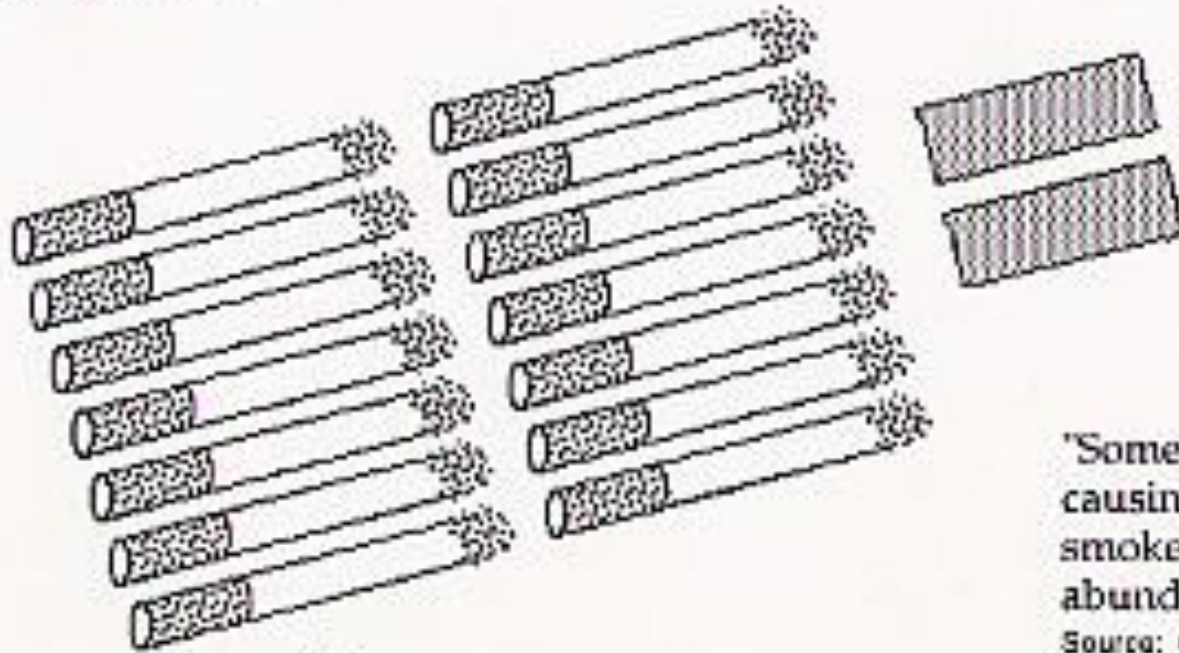
- Fine smoke particles are small enough to be able to get deep into your lungs and cause serious problems
- Particles can remain there for months causing structural damage and chemical changes
  - Increase cardiovascular problems, irritate lungs and eyes, trigger headaches, hinder judgment, slow reflexes, and worsen respiratory diseases such as asthma, emphysema and bronchitis



While wood smoke harms us all, it is especially harmful to babies, children, pregnant women, their unborn children and the elderly.

## Wood Smoke Versus Cigarette Smoke

An EPA Study concludes that breathing wood smoke particles during high pollution days is equivalent to smoking 4 to 16 cigarettes.



"Some of the same strong cancer causing chemicals found in cigarette smoke have also been found to be abundant in wood smoke."

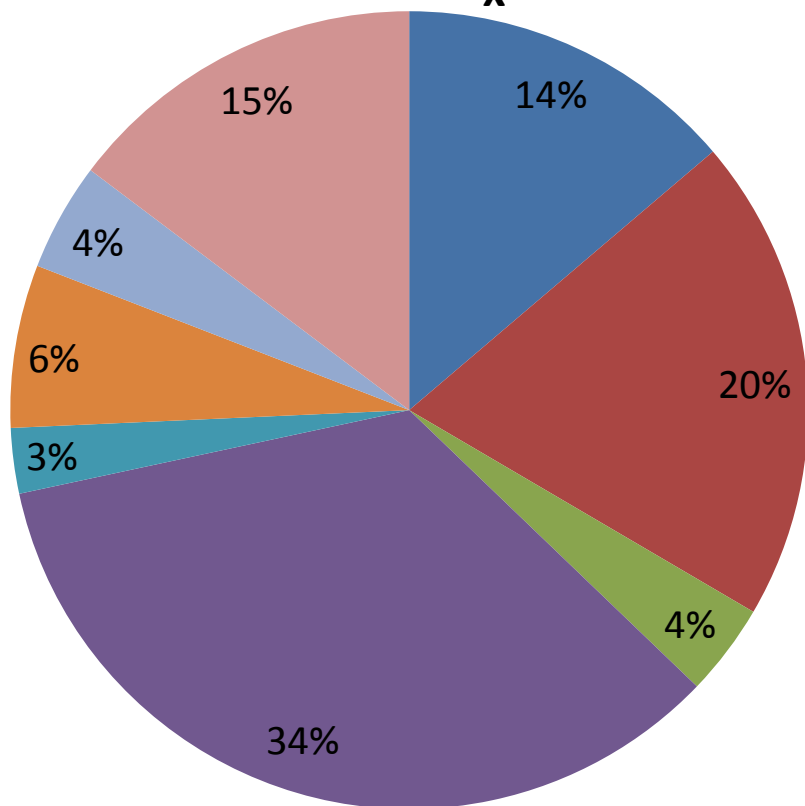
Source: Cooper [1990]



Particulate  
Pollution  
Project

*The Dangers of Particulates*

# NO<sub>x</sub> Woodburning Emissions by Region



■ CENTRAL MOUNTAINS

■ DENVER/NORTH FR

■ EASTERN PLAINS

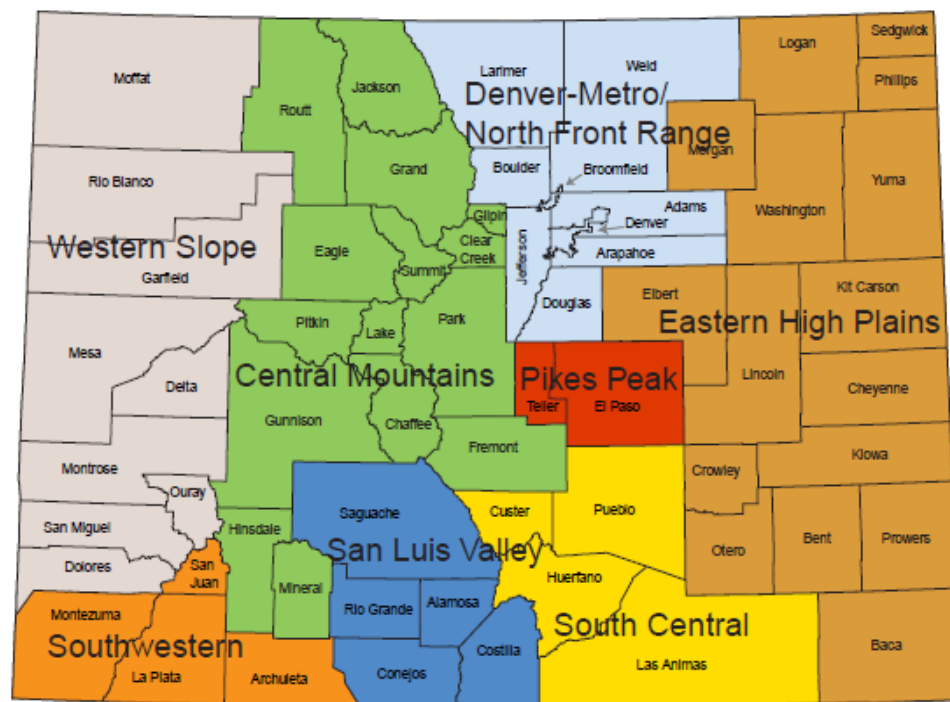
■ PIKES PEAK

■ SAN LUIS VALLEY

■ SOUTH CENTRAL

■ SOUTHWESTERN

■ WEST SLOPE



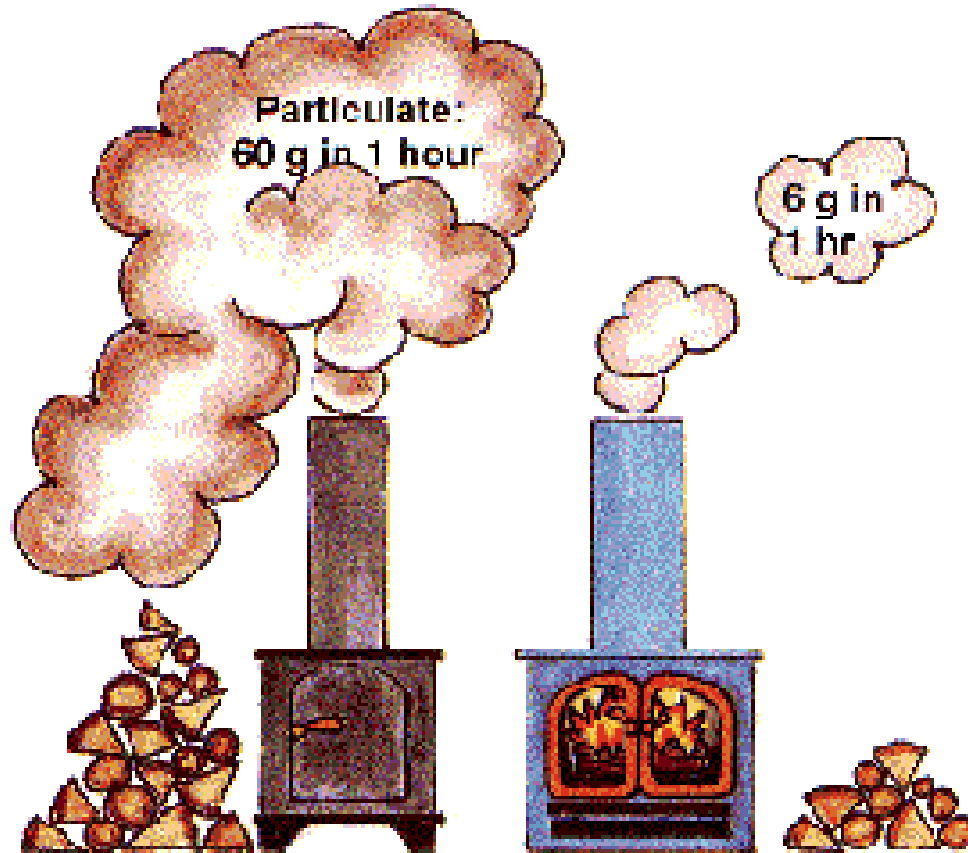
**Although this graph is only for NO<sub>x</sub> it is approximately the same for other woodburning pollutants (PM<sub>10</sub>, VOC, CO)**

*\*\*This is an ANNUAL average with woodburning pollution concentrated during cold wintertime inversion periods.*



# Regional Collaboration Counties with Above Average Woodburning Emissions

- Chaffee
- Lake
- Park
- Summit
- Rio Grande
- Eagle
- Garfield
- San Miguel
- Clear Creek
- Delta



# REDUCING WOODBURNING EMISSIONS

# Educating the Public

- Engaging the public and giving them the tools to make the right decisions about what they burn and how they burn is the first step in an overall wood smoke plan



- 1 Burn the right wood**  
Save money and time.  
Burn only dry, seasoned wood  
and maintain a hot fire.
- 2 The right way**  
Keep your home safer.  
Have a certified technician  
install and annually service  
your appliance.
- 3 In the right appliance**  
Make your home healthier.  
Upgrade to an efficient,  
EPA-approved wood-burning  
appliance.

### Four Easy Steps to Dry Firewood

 <b>STEP 1</b> <b>SPLIT</b>	 <b>STEP 2</b> <b>STACK</b>
 <b>STEP 3</b> <b>COVER</b>	 <b>STEP 4</b> <b>STORE</b> <sup>11</sup>

## Don't Let Your Investment Go up in Smoke

Burn Dry, Seasoned Firewood

Breathe easier and save money, energy, and time with these four simple steps:

1. **Split** wood for faster drying.
2. **Stack** wood split side down and away from buildings.
3. **Cover** top of the stack to protect it from rain or snow.
4. **Store and dry** softwood for at least 6 months and hardwood for at least 12 months.

Learn before you burn.  
Go to [epa.gov/burnwise](http://epa.gov/burnwise)



facebook.com/EPABurnWise  
twitter.com/epaburnwise



# EPA BurnWise Program

- EPA educational campaign
- Messages include:
  - Cost savings
  - Improved safety and health benefits
  - Energy efficiency
- Brochures and outreach materials available at:  
<http://www.epa.gov/burnwise/burnwisekit.html>





# Tips for Burning

<http://www.epa.gov/burnwise/pdfs/BurnWiseTips.pdf>

- Season all firewood
- Choose the right firewood
- Start it right
- Don't let the fire smolder
- Clean ashes from your wood-burning appliance
- Appliance size matters
- Follow best practices for burning wood
- Comply with state and local codes
- Check your local air quality forecast
- Follow manufacturer's instructions
- Upgrade to cleaner equipment



# EPA Regulations

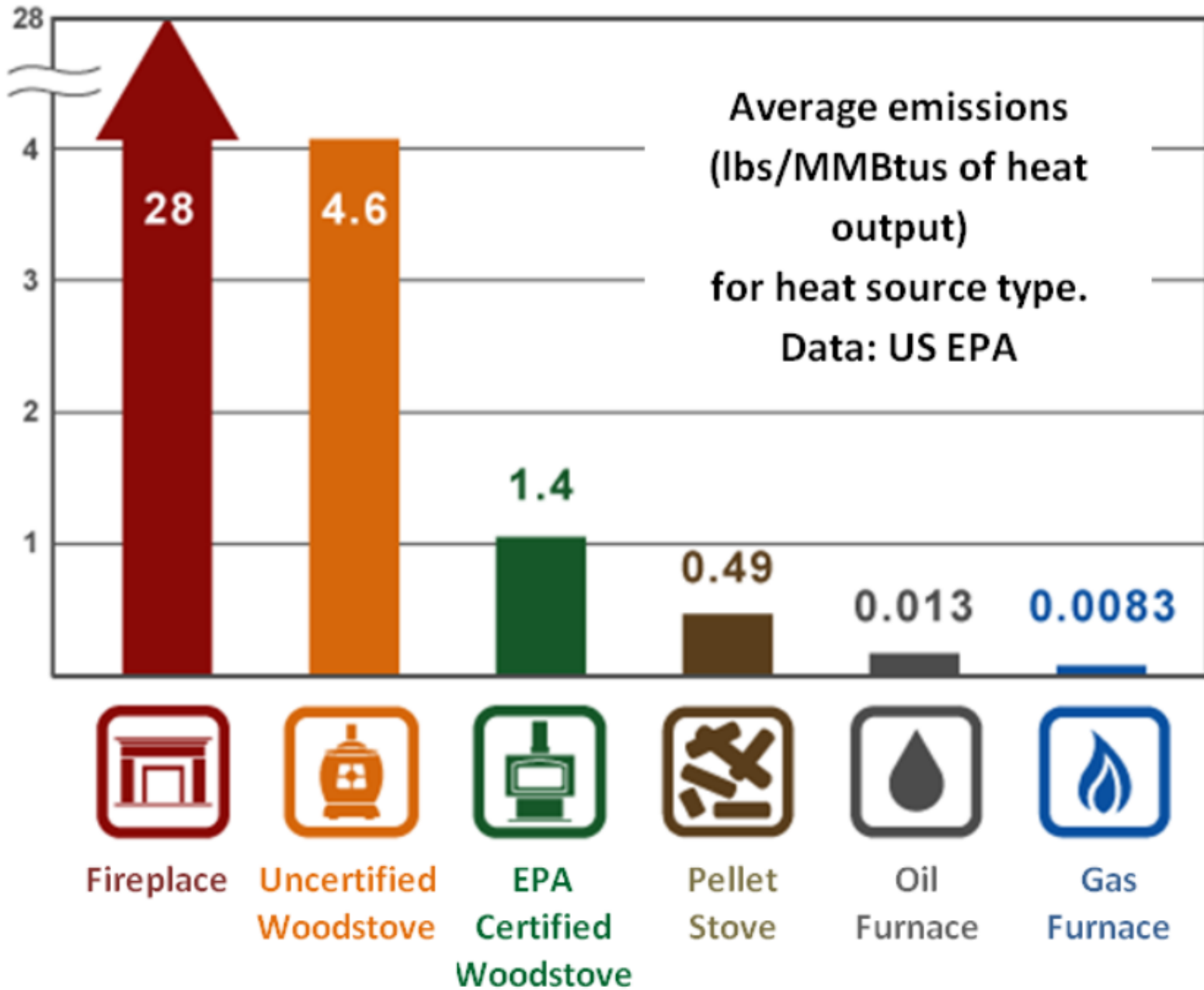
- **Residential wood combustion by fireplaces is not regulated by the EPA**
- Residential Wood Heater New Source Performance Standard (NSPS) requires wood stoves and fireplace inserts to be certified by EPA for lower emissions
- The EPA **voluntary certification program** will help reduce air pollution by encouraging manufacturers to develop new, cleaner wood-burning fireplaces
- EPA-certified wood stoves are designed with better insulation and improved air flow therefore more gases and particles are burned inside the stove, resulting in less smoke.



# EPA Approved Residential Burning Devices

- About 70% cleaner
- Certified Woodstoves list:
  - <http://www.colorado.gov/cs/Satellite/CDPHE-AP/CBON/1251595640167>
- Exempt from the residential burning regulation (Reg. 4)
- Models tested by independent accredited laboratory

# Relative Emissions of Fine Particles





# CDPHE's Wildfire Smoke Messaging

Through CDPHE's website, social media ([Facebook](#) & [Twitter](#)), [EnviroFlash](#), telephone hotlines and media advisories:

*"If visibility is less than 5 miles, smoke has reached levels that are unhealthy. If smoke is thick or becomes thick, remain indoors. This is especially true for those with heart disease, respiratory illnesses, the very young, and the elderly. **Consider limiting outdoor activity when moderate to heavy smoke is present.** Consider relocating temporarily if smoke is present indoors and is making you ill."*

– <http://www.colorado.gov/airquality/addendum.aspx#smoke>

- Subscribe to EnviroFlash notification system:

- <http://www.enviroflash.info/signup.cfm>

- Install Smoke Outlook Thumbnail on your website!

- [http://www.colorado.gov/airquality/install\\_thumbnail.aspx](http://www.colorado.gov/airquality/install_thumbnail.aspx)



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# High Pollution Day



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- You can call the 24-hour Air Quality Advisory hotline during the High Pollution Season at **303-758-4848**
- APCD posts advisories on its website at:  
<http://www.colorado.gov/airquality/advisory.aspx>
- Many local newspapers, radio and television stations also provide updates
- Burning is restricted by CDPHE in the seven-county Denver-metro area



## CDPHE Regulation NO. 4

- Applies to **Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, and Jefferson**,  
\*not including areas above 7,000 feet elevation
- Limitation on the sale and installation of wood-burning stoves, pellet stoves, masonry heaters
- Limitations on the use of wood burning appliances (unless the appliance is exempt)
- Prohibits the use of uncertified devices on air quality **High Pollution Days**



# Local Regulatory Options

- Burn bans
- Opacity and visible emission limits
- Wood moisture limits
- Removal of old wood stoves upon resale of homes
- Bans on non-EPA certified wood stoves
- Bans on wood-burning devices in new construction
- Hydronic heater (wood boiler) emission rules or Bans





# Examples of Local Efforts

- Garfield And Mesa County - woodstove exchange program
- Mesa County has Burn/No Burn messages in daily forecasts during burning season
- Grand Junction's Municipal Code regulates wood stoves and fireplace burning
- San Miguel County Land Use Code- Prohibits installation of solid-fuel burning devices in the Telluride Region
- City of Montrose Municipal Code- Woodstove certification and installation
- Routt County Resolution Number 91-032- Woodstove certification and installation

# Examples of Local Efforts

- Eagle County- [Regulations](#) to limit the number of wood burning devices in new construction and require certified wood stoves
- Pitkin County and City of Aspen- regulates the number of fireplaces and woodstoves that can be placed in buildings and require certified wood stoves
- Summit County- All new stoves must be certified. Educational [video](#) on proper burning
- Park County-Requires a permit for stove installation

# Potential to create a Woodstove Changeout Campaign in your area

- Wood Stove Changeout Campaign can reduce the amount of air pollution from wood smoke in your area
- Voluntary program can be an effective way to reduce emissions of particulates and air toxics
- <http://www.epa.gov/burnwise/how-to-guide.html>



# Funding Options



- [Supplemental Environmental Projects \(SEPs\)](#)
- Campaign partners
- Grants
- Discounts and rebates on new, cleaner appliances from manufacturers or retailers
- Tax credits and low-interest loans
- Tax on the sale of wood stoves
- Monies from Fines and Penalties
- Local utility companies



# Upcoming Woodstove Regulation Changes

- EPA will propose the rule in Fall 2013 and finalize in **Fall 2014**
- Tighten emissions limits for currently regulated wood stoves (cleaner, lower emitting, and more efficient)
- Regulate new:
  - Single-burn-rate stoves
  - Pellet stoves
  - Wood-fired hydronic heaters and indoor wood furnaces
  - Masonry heaters
- Apply only to **new** residential wood heaters and not to existing residential wood-heating appliances

# QUESTIONS ABOUT INDOOR BURNING?





# Thank You!



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# My neighbor is burning on a High Pollution Day, what should I do?

- Call the 24-hour residential burning hotline:  
— 303-692-3280
- If the state has jurisdiction, we will contact the suspected violator
- If a local municipality has jurisdiction, we will provide representatives with the reported information and the local government will follow up on the complaint



# PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS)

Primary/ Secondary	Averaging Time	Level	Form
primary and secondary	24-hour	35 µg/m <sup>3</sup>	98th percentile, averaged over 3 years
Primary <i>(health based)</i>	Annual	12 µg/m <sup>3</sup>	annual mean, averaged over 3 years
Secondary <i>(environmentally based)</i>	Annual	15 µg/m <sup>3</sup>	annual mean, averaged over 3 years